CubeSats towards outer space: solutions and challenges for the propulsion subsystem

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Abstract. With their small dimensions, reduced costs, and fast production, CubeSats are gaining importance every day. Nowadays, several CubeSats are orbiting in Low Earth Orbits (LEO) for telecommunication, earth observation, demonstrators, but the interest in using CubeSats for space explorations and operations beyond LEO is growing. Some missions have been launched with the objective to demonstrate the feasibility of CubeSat in deep space (e.g., LICI-ACube, MarCO), and others will be launched in the next years (e.g., APEX). Nevertheless, several challenges must be solved to massively allow CubeSats to reach outer space, and, among the others, the propulsion subsystem is one of the most delicate. In fact, due to the limitations in terms of volume and mass, the propulsion subsystem is subjected to strict requirements in terms of specific impulse, thrust and reliability. In this talk, an analysis on the possible solutions for the propulsive subsystem for CubeSats will be presented, with particular attention to Electric Propulsion and Cold Gas. The recent advancements in propulsion subsystems and their applicability to CubeSats for deep space operations will be discussed. Finally, open challenges and future work will be evaluated.

Keywords: Propulsion, CubeSat, Deep Space